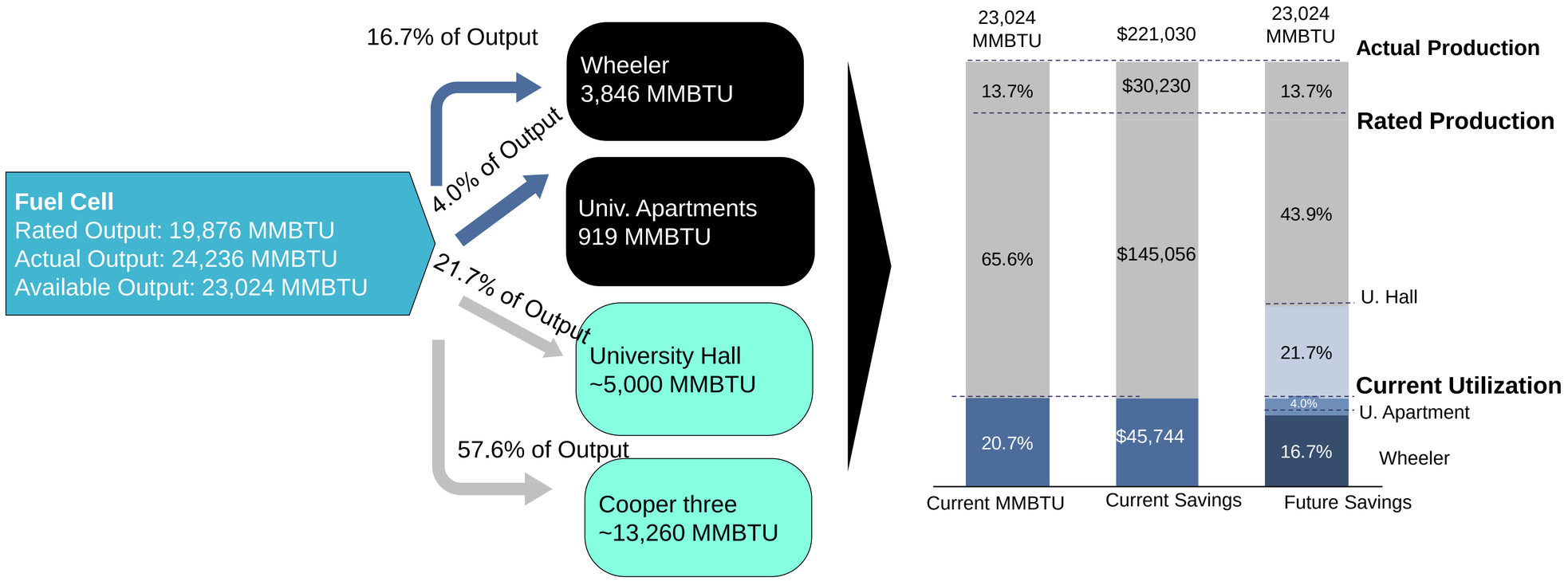
The utilization of fuel cell waste heat at the University of Bridgeport

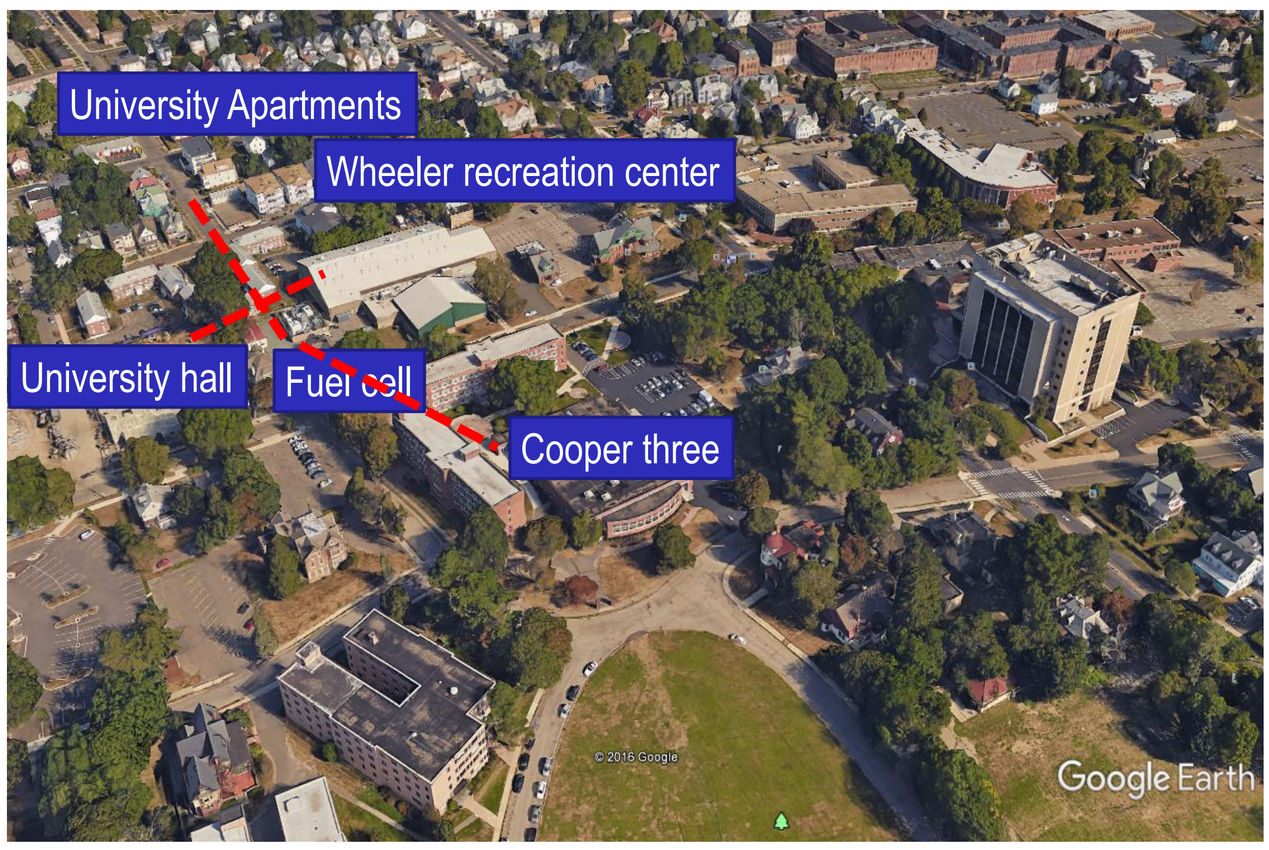
Linfeng Zhang, Junling Hu, David Cote
Department of Electrical Engineering, Department of Mechanical Engineering, Facility office
University of Bridgeport, Bridgeport, CT 06604

1. Introduction

District heating system is cost effective and helps to reduce green house gases. It uses the waste heat from existing power plants to provide low temperature heat to the commercial and residential buildings.
At UB, the 1.4 MW fuel cell system is owned by another company and the waste heat is free to us. Currently, less than 50% of the waste heat is utilized in several buildings.



2. Heating loop at UB



Aerial view of the campus

Existing heating loop to serve three buildings:
- Wheeler Recreation Center
- The University apartments
- The University Hall (connected but not supplied)

Heat source: 1.4MW fuel cell station

Wheeler Recreation Center and the University Apartments are heated by the fuel cell station, but they also rely on boilers to provide additional heating.

The University Hall currently is only heated by boilers due to the lack of an appropriate expansion tank.

Cooper three will be connected.

3. Life cycle cost

#	Components	Life span (years)	Initial cost ($)	Present worth ($)
1	Heat Exchanger	25	5,000	5,000
600 ft	4” Pex piping	25	16,587	16,587
1	Pump	10	2,500	2,500
1	Pump (10 year)			2487.5
1	Pump (20 year)			2,475
57	Installation	N/A	159,000	159,000
N/A	Miscellaneous	N/A	5,000	5,000
7	Annual Maintenance		300	7,451
Life cycle cost				200,500

Inflation rate is set as 2.3% and interest rate is set as 2.35%

Saving in 25 years

Heat (MMBTU)	Annual saving (k$)	25 years (k$)
6630	79	1,965

Social cost

Heat (MMBTU)	Natural gas (ton HHV)	CO_2 (ton)	Annual Social cost (k$)	25 years (k$)
6630	126	347	13.9	345.2

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